

Victory Sappers: V Corps/CJTF-7 Engineers in Operation Iraqi Freedom

Part 2: Since the Liberation . . .

By Colonel Gregg F. Martin

Part 1, "The Attack to Baghdad and Beyond . . ." was published in the July-September 2003 issue of *Engineer*.

"Our engineers continue to excel, both in leading the way toward the reconstruction of Iraq and in providing route clearance, force protection, quality-of-life improvements, and troop construction for our deployed Coalition Joint Task Force. They remain flexible, committed, and professional during this challenging campaign."

—Major General Walter Wojdakowski
Deputy Commanding General, V (U.S.) Corps/CJTF-7

With the fall of Baghdad and the collapse of Saddam Hussein's regime in early April 2003, Iraq was liberated. Since then, V Corps and other coalition forces have grown in size and combat power; expanded into and attacked enemy forces throughout the battlespace of Iraq; and conducted humanitarian, civic action, and reconstruction operations simultaneously. The V Corps engineer force of fewer than 4,000 soldiers that attacked into Iraq on 21 March grew to more than 19,000 under Coalition Joint Task Force - 7 (CJTF-7). This engineer force consists of nearly every type of unit within the U.S. Army Engineer Regiment (active duty, National Guard, Reserve, and civilian), as well as engineers from the Marine Corps, Navy, and Air Force and from coalition forces.

With the mission to reconstruct Iraq and win the peace, this powerful engineer force has performed every type of mission in a complex combat environment across hundreds of thousands of square kilometers, to include—

- Combat engineer and infantry missions.
- Construction and repair of infrastructure, base camps, and facilities.
- Fixed and assault float bridging.
- Ground and riverine patrols.
- Topographic/geospatial engineering from the tactical through strategic levels.
- Diving, well-drilling, and fire-fighting missions.
- Electrical-power repair, generation, and distribution.
- Infrastructure assessment, repair, and reconstruction.
- Contract construction and facilities design and management.
- Asphalt, concrete, and crushed stone production.
- Captured enemy ammunition and missile destruction.

This article highlights what the 130th Engineer Brigade and echelon-above-division (EAD) engineers have accomplished since the liberation of Iraq, as well as the leadership and organizational challenges that have been overcome. This article, in conjunction with "130th Engineer Brigade Lessons Learned and Recommendations From Operation Iraqi Freedom" (page 11) captures important lessons which will help the Engineer Regiment and improve the Future Force.

(Note: The role of divisional and echelon-above-corps (EAC) engineers, as well as the U.S. Army Corps of Engineers (USACE) and contractors, each of whom played a major role, is beyond the scope of this article.)

Background

In December 2002, V Corps and the 130th Engineer Brigade were ordered to deploy to Kuwait and prepare for possible combat operations. The brigade deployed in January and February 2003 and in late February finalized the initial EAD engineer task organization to support V Corps's initial maneuver elements, which included the 3d U.S. Infantry Division (3ID) (V Corps main effort) and the 11th Attack Helicopter Regiment (V Corps supporting effort.)

In March, the 130th conducted rehearsals, prepared for combat, and helped supervise the reduction of the Kuwait-Iraq border obstacle complex. On 21 March, the 130th crossed the line of departure in support of V Corps in the liberation of Iraq. V Corps attacked up the southwest side of the Euphrates River past An Nasiriyah, through As Samawa, and on to An Najaf, while the 1st Marine Expeditionary Force (1MEF) attacked along the Euphrates River to An Nasiriyah, north to Al Kut, and then along the eastern side of the Tigris River. Fighting a tough and determined enemy, V Corps secured its lines of communication and continued to build combat power

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The Minnesota National Guard's 142d Engineer Battalion places concrete for a high-voltage power plant at LSA Anaconda in Balad, Iraq.

at Logistics Support Areas (LSAs) Cedar in the vicinity of An Nasiriyah and Bushmaster in the vicinity of An Najaf, as it prepared for the final attack on Baghdad.

Near the end of March, the 101st Airborne Division (Air Assault) and the 82d Airborne Division (-) joined the attack, conducting major military operations in urban terrain, which relieved pressure on the main effort (3ID). This enabled 3ID to launch the final push through the Karbala Gap on 3 April, attack over the Euphrates River, complete the destruction of the Medina Republican Guard Division, and seize objectives south and west of the city of Baghdad—to include Baghdad International Airport. Simultaneously, 1MEF was pushing into objectives southeast and east of Baghdad. Within a few days, V Corps and 1MEF forces were executing “thunder runs” throughout Baghdad.

Before the enemy could mount an effective defense, V Corps and 1MEF had won the much-anticipated “Battle for Baghdad.” The shock and speed of U.S. military power, combined with the courage and leadership of our ground forces, overwhelmed the enemy. With this new freedom came a vacuum in power and authority as the regime’s surviving army and police forces collapsed or melted away.

By late April, V Corps had gained the 4th Infantry Division and 3d Armored Cavalry Regiment and controlled the northern 60 percent of Iraq; 1MEF and United Kingdom forces controlled the southern 40 percent. In May, the 1st Armored Division moved into Baghdad and completed a relief in place with 3ID.

In May, V Corps learned that it would form the nucleus of CJTF-7, which would stand up on 15 June. In addition, an enormous EAD engineer force had arrived in Kuwait (to supplement the engineers already in place) and completed reception, staging, onward-movement, and integration (RSOI), and its members were either in Iraq or preparing to move north for subsequent operations.

Task Organization

By June, the V Corps (and subsequently CJTF-7) engineer force had increased to 19,000 soldiers (6,000 divisional engineers and 13,000 EAD engineers) organized into 3 brigades, 6 groups, 36 battalions, 21 numbered companies, and 28 detachments. (Note: These figures do not include coalition engineers embedded inside the multinational divisions; joint engineers from the Marines, Navy, or Air Force; or EAC engineers under the 416th Engineer Command or Coalition Forces Land Component Command (CFLCC).

Depending on mission requirements and the tactical situation, which fluctuated over time, each division ultimately received an EAD package that generally consisted of a group headquarters; 1 or 2 corps combat battalions; 1, 2, or even 3 combat heavy battalions; 1 or more multirole bridge companies; an additional construction company (combat heavy or combat support equipment [CSE]); a utilities detachment; a facilities engineer team (FET) or portion of a facilities engineer detachment (FED); and a fire-fighting detachment. Well drillers, divers,



Prime power soldiers from the 249th Engineer Battalion prepare wiring for a branch circuit to refrigerate Army and Air Force Exchange Service storage containers.

and topographic, bridging, and prime power soldiers, as well as USACE Forward Engineer Support Teams (FESTs) were also provided on an as-needed basis.

Although the size and composition of the 130th Engineer Brigade has changed, a typical snapshot from June to September revealed a unit composed of approximately 6,500 to 7,000 soldiers organized into 3 groups; 5 combat heavy battalions; 2 corps wheeled battalions; 2 corps mechanized battalions; a bridge battalion with an assault float bridge company and a medium girder bridge company; a Korean battalion (plus a Republic of Korea army medical company); 3 combat support equipment companies; 3 multirole bridge companies; a construction support company; a prime power company; a topographic engineer company; and numerous detachments and teams, including utilities, fire-fighting, diving, well-drilling, FETs, FEDs, and FESTs.

Operating throughout Iraq since the end of the ground offensive, this robust, multifunctional brigade has executed more than 3,000 missions, focused on V Corps and CJTF-7 priorities, and backstopped every division and major subordinate command (MSC) on a wide variety of missions.

(Note: Always adapting to meet the needs of the battlefield and providing the best possible engineer support, several of the above-mentioned units have since been moved to maneuver units.)

Missions, Priorities, and Commander's Guidance

Missions

Once maneuver forces had secured their areas of operations, the priority of engineer effort was to provide mobility, survivability, and general engineering support to V Corps forces to allow the Iraqis to rebuild their nation, establish a stable government, and develop a peaceful, prosperous society. Reconstruction of civil infrastructure and humanitarian construction in support of the Iraqi people were to be accomplished by civilian contractors under the supervision of the coalition's Office of Reconstruction and Humanitarian Assistance (ORHA). The original plan was for military engineers to focus almost exclusively on support to V Corps and coalition forces. The 130th was to provide humanitarian engineering only under emergency circumstances. Contractors were to take on as much work as possible to regenerate the economy, put people back to work, and rebuild the country. (Note: The USACE-led Task Forces Fajir [New Light] and Restore Iraqi Oil [RIO] were already well under way to restoring Iraqi electrical power and

oil, using a combination of USACE and Iraqi expertise and civilian contractors.)

The 3ID engineer team, working in Baghdad since the collapse of the regime in early April, was already responding to the urgent situation and was performing extensive civil and humanitarian construction. By late April and early May, after V Corps forces had expanded into the battlespace of northern and western Iraq, the dire straits of the Iraqi people and their dilapidated infrastructure became more apparent. Soon, military engineers were called on to provide emergency assessments, construction, and repairs. By 12 May, it became clear that the situation demanded a focused emergency response. Military engineering resources were diverted to immediate civil requirements as civilian engineer contractors were unable to respond to demands. With the original Task Force Neighborhood in Baghdad—a concept conceived by the V Corps commander and assigned to the 130th Engineer Brigade for planning and execution—military engineers leaped fully into the fray of civil-military operations and humanitarian construction. This concept rapidly expanded to maneuver and engineer units throughout Iraq. By mid-May, V Corps engineers were fully engaged in both military engineering in support of V Corps forces and humanitarian/civil-military engineering operations in support of the Iraqi people and society.

Standing Up the C-7. Upon learning that V Corps would form the nucleus of the new CJTF-7, the 130th Engineer Brigade

and the V Corps staff engineer section went to work planning, sourcing, and standing up the new CJTF-7 staff engineer section (C-7)—a 55-person coalition-joint staff that would take over engineer staff planning and coordination from the 18-person V Corps staff engineer section. This enormous planning, leadership, and logistical challenge was made even more difficult because it was accomplished in the midst of RSOI, combat, and stability operations. With “cover-down” personnel from both V Corps and CFLCC to temporarily fill the joint manning document, the new C-7 officially took over the engineer fight in Iraq on 15 June.

The C-7 immediately faced three strategically critical missions: providing facilities for the new Iraqi army, bedding down and constructing operational infrastructure for coalition forces, and destroying captured enemy ammunition. Taking into account the relative strengths of troop units, USACE, and contractors, the C-7—in conjunction with the other elements of the CJTF-7 engineer team—developed innovative solutions for these missions. Next, C-7 needed to rapidly increase electrical power production throughout Iraq to make an immediate positive impact on the lives of the Iraqi people. The solution was to form “Task Force 4400,” which put coalition military engineers into Iraqi power plants to improve management and operation, expedite repairs, and quickly increase power production across the nation to 4,400 megawatts.

Transitioning to a Theater Army Engineer Brigade. Simultaneously, the 130th Engineer Brigade became the de facto theater Army engineer brigade (TAEB) in Iraq. Manned and trained to perform as V Corps’s combat engineer brigade,

the 130th had to stretch itself physically, mentally, organizationally, and doctrinally to effectively perform this new role. Adding to the challenge was the need to staff three command posts: a rear command post in Kuwait to command and control the RSOI of incoming EAD forces; the brigade main command post at the V Corps logistics and air hub in north-central Iraq; and the brigade tactical command post in Baghdad, where it played a key role in standing up the new C-7. Although the 130th was transitioning to a TAEB, it was still fulfilling its primary mission of supporting V Corps’s MSCs throughout Iraq.

Exacerbating the situation was the requirement to send the 130th Engineer Brigade deputy commander to work as the V Corps engineer at ORHA in downtown Baghdad. Supplementing and reinforcing ORHA and then the Coalition Provisional Authority (CPA) was critical to the planning, funding, and execution of both civilian and military engineering programs in Iraq. His experience in both USACE and joint engineering operations made him ideal for these key strategic roles, where he has made a valuable contribution.

Fortunately, the commander of the 18th TAEB dispatched one of his key lieutenant colonels to be the new deputy commander of the 130th. Having just served as the operations officer of the 18th TAEB, where he planned and developed military infrastructure for the northern option, the new deputy commander brought his organizational expertise to the fight in Iraq. Arriving in late June and serving as the deputy commander for 101 days, he helped recast the 130th from a combat-focused corps engineer brigade to a construction-focused TAEB.



The 565th Engineer Battalion patrols the Tigris River at Tikrit, Iraq.



A soldier from the 320th Engineer Company (Corps) (Topographic) uses an automated integrated survey instrument at LSA Anaconda.

Cooperating with the C-7, the 130th Engineer Brigade played a key role in fulfilling several major functions which went beyond its doctrinal mission. (Note: Several of these functions were ultimately taken over by the C-7.)

- Engineer oversight and construction/design support to theater/CJTF-7 enduring bases.
- Execution of the theater/CJTF-7 construction program.
- Engineer reinforcing support to the MSCs for master planning, design, and assessments; oversight of Class IV supplies; and direct support when MSC engineering requirements exceeded their capabilities.
- Assistance to the C-7 in theater engineer planning, force structure management, and personnel.
- Establishment of a theater bridge park.

The 130th Engineer Brigade faced the following challenges:

- It was a corps combat brigade now cast in the role of a TAEB.
- It did not have an organic construction management section (CMS) comparable to the robust 36-person CMS in a TAEB. (Note: The 130th does have a small CMS element which will return to the 18th Engineer Brigade, from which it came about a decade ago.)
- With the stand-up of the C-7, the 130th lost its organic staff engineer section, which became the nucleus of the C-7.
- Of the engineer groups assigned to the 130th for command and control of construction in Iraq, two are combat groups with no CMS, and the one construction group has very few personnel with engineering degrees. This reinforced the need for a strong CMS in the 130th.
- Development of LSA Anaconda was the largest construction mission in Iraq, but the assigned FET was not resourced adequately for such a huge mission.

- Division engineer brigades and combat engineer groups throughout Iraq are not staffed to manage large construction missions, which means the 130th must be prepared to backstop the construction program throughout the theater, as required.
- There was no theaterwide plan to provide quality assurance for contract construction in support of coalition forces, so the 130th must be prepared to backstop this effort.

To accomplish its mission as TAEB, the 130th Engineer Brigade made the following organizational adjustments:

- Relocated and embedded a portion of a FED into the 130th staff and combined it with the remnants of the 130th CMS to perform the functions of the TAEB's "missing CMS."
- Relocated the V Corps FEST from the C-7 and aligned it under the 130th CMS.
- Created a 16-person 130th CMS that, in cooperation with the C-7, performed construction management at the CJTF-7 enduring base camps; provided master planning, design, assessments, and contract facilitation to theater enduring base camps; managed Class IV supplies; and provided reinforcing support throughout Iraq to the C-7 and MSCs.

130th Engineer Brigade Commander Priorities

In July, after "sprinting" for six months through the deployment, preparation for combat, ground offensive, movement into the Iraqi battlespace, and stand-up of the C-7, the one-year tour length for Operation Iraqi Freedom was announced. It became clear we could not function effectively without developing a way to accomplish the mission, train, maintain, take care of people, and sustain ourselves for the long haul. Since we were conducting combat operations but also were conducting many of our functions in a garrison-like environment, I directed the 130th Engineer Brigade staff to develop standard operating procedures (SOPs) that described how we would do business in Operation Iraqi Freedom, an

environment in which neither our field SOP nor our garrison SOP applied neatly.

Simultaneously, I reviewed my command philosophy, which was published in June 2002 after taking command of the 130th Engineer Brigade in Germany. My intent was to make sure that the vision laid out during peacetime in Europe still applied for the brigade at war in Iraq. I did not change a word, because it still applies to what we are doing:

- People are our essence. Care for, develop, and inspire them.
- Training is the glue that holds us together. Focus on the basics of “shoot, move, communicate, and survive” at individual, crew, and squad levels to ensure that our soldiers stay alive to accomplish the mission and get home safely when the time comes.
- Maintenance of equipment and people will sustain us over time and enable us to accomplish the mission.
- All of this must be encased under the overarching umbrella of discipline, safety, and force protection.

Commander’s Guidance

With enormous demand for engineers but only limited resources, I established a priority of engineer effort that met the CJTF-7 commander’s intent and guidance:

- Provide coalition forces with mobility, survivability, and general engineering support during military operations to create a safe and secure environment.
- Provide force protection and beddown construction to protect our soldiers and provide a decent quality of life (at a minimum: out of the dirt, environmental control units, toilets, and showers.)
- Support CPA and Iraqi people with civil infrastructure, humanitarian civic action, and Task Force Neighborhood missions.
- Train to survive on the battlefield. We can afford to lose a day on a project to ensure that our soldiers are prepared for the challenges and dangers they face daily.
- Do “good things” to help coalition forces and the Iraqi people. Let’s work ourselves out of a job.
- Ensure that engineers are gainfully employed at all times—no idle engineers.
- Respond immediately to 911 calls. Be flexible and ready to respond. We are at war!
- Perform other missions as needed.

Subordinate commanders were instructed to develop a sustainable operational tempo which would ensure mission accomplishment while building better, stronger, more motivated soldiers and units that would be better and more inspired when they departed Iraq than when they arrived in theater. We enhanced our daily communications rhythm of battle update briefs, staff updates, and engineer video teleconferences with weekly maintenance conferences; biweekly planning and

operations conferences; and monthly commanders conferences, training briefs, and unit status reports. The intent was to enhance our communications, connectivity, and future planning. In addition, my specific guidance to everyone in the brigade was as follows:

- We will be in Iraq for a full year. This is a grueling and dangerous “ultramarathon.” Plan accordingly.
- Reestablish predictability and retain the ability to respond immediately to “hot missions” and 911 calls.
- Establish the proper balance between the mission and people/training/maintenance/supply, and emphasize the human dimensions of job/mind/body/spirit/family/friends.
- Learn continuously and grow as a professional each day.
- Encourage everyone to “sharpen the ax” and “recharge batteries” each day.
- Get enough rest, eat a healthy diet, work out, and maintain personal hygiene.
- Strive to take one day off each week, and when it makes sense, take leave or rest and relaxation.
- Support the chaplains’ programs and help inspire soldiers to maximize their time in Iraq and on earth.
- Make time for physical training and sports and social events such as movie nights, karaoke nights, and soldier talent shows. Make this year in Iraq the ultimate soldier and life experience.
- Make a positive difference every day. Help others. Be a good person and friend.
- Stay positive and enthusiastic, and maintain an “attitude of gratitude” in all circumstances.
- Have fun, and enjoy each day. This is important in a combat zone, where any day could be your last.

Leaders relentlessly communicated, enforced, and tried to live this philosophy every day, while encouraging subordinates to follow suit.

Major Achievements

Since the liberation and end of major combat operations, the 130th Engineer Brigade has contributed to Operation Iraqi Freedom by completing more than 3,000 missions in support of CJTF-7, MSCs, CPA, and the Iraqis, to include the following highlights:

- Provided combat, construction, topographic, design, prime power, infrastructure assessment, bridging, riverine, fire-fighting, and diving support throughout Iraq.
- Planned and executed the original Task Force Neighborhood missions in Baghdad.
- Planned, organized, and stood up the C-7 for CJTF-7. Continues to provide a nucleus of personnel for this vital and successful staff section.

- Developed the prisoner holding areas, interrogation facilities, helipad, and coalition base camp for the Baghdad Central Confinement Facility.
- Planned, designed, and constructed the largest CJTF-7 base camp (LSA Anaconda) and repaired the heavily damaged airfield by placing more than 8,000 cubic meters of concrete.
- Provided construction support to both ORHA and CPA.
- Delivered and installed a 20-megawatt power plant at the Basra oil refinery, averting widespread rioting.
- Worked with Iraqis to repair high-tension electrical power lines in support of CPA.
- Upgraded a 100-kilometer stretch of Highway 1 in southern Iraq so it could serve as a safe main supply route.
- Reduced hundreds of kilometers of berms and fighting positions throughout Iraq that were potential ambush sites.
- Hauled tons of captured enemy ammunition to secure sites for destruction.
- Planned, coordinated, and provided command and control of Task Force Rocketeer, in which the 130th helped secure and destroy dozens of surface-to-air missiles throughout Iraq.
- Planned and executed more than 100 humanitarian and civic action projects throughout Iraq, to include the renovation of schools, health clinics, playgrounds, and sports facilities.
- Assigned units planned, executed, and managed nearly \$900 million worth of contractor or contractor-equivalent construction. (Note: The 937th Engineer Group's facilities program for the new Iraqi army is valued at \$800 million.)
- Trained forces on the South African Interim Vehicle-Mounted Mine-Detection System (IVMMDS) and developed combined arms tactics, techniques, and procedures to use this system to detect and neutralize enemy mines and improvised explosive devices (IEDs).
- Developed Task Force Right of Way, using the IVMMDS, sappers, and earthmoving equipment to detect and neutralize IEDs along main supply routes. Established a training academy and exported this concept to MSCs.
- Trained forces for the new Iraqi Civil Defense Corps in support of the Ukrainian brigade of the Polish-led multinational division in south-central Iraq.

Conclusion

The Victory Sappers of V Corps and CJTF-7 built a cohesive, motivated, multifunctional engineer team of more than 19,000 active duty, Reserve, and National Guard soldiers and civilians from all four Army corps, comprising every facet of the U.S. Army Engineer Regiment. This dynamic team has executed thousands of missions of every type over hundreds of thousands of square kilometers. It has incorporated joint and coalition engineers into the team as it continues to assure the mobility, survivability, and force

beddown of first V Corps and now CJTF-7. The Victory Sappers "engineered the victory" during the ground offensive and have played a critical and larger-than-expected role in rebuilding Iraqi infrastructure. The Victory Sappers continue to play a key role in support of coalition efforts to win the peace and build a stable and prosperous Iraq.

Members of the 130th Engineer Brigade are grateful for the privilege of serving in Operation Iraqi Freedom. No matter how tough the situation, we have chosen to have "an attitude of gratitude" in all circumstances. We are thankful and proud to be engineers and are committed to ensuring victory. We hope that our experiences, lessons learned, and recommendations are beneficial to the Engineer Regiment and the Army so that we improve the Future Force.



Colonel Martin has served as commander of the 130th Engineer Brigade and as V Corps engineer since June 2002. After deploying to Kuwait, he led the brigade's attack on Day One of the ground offensive and has served in Iraq since. He also served as the CJTF-7 director of engineering C-7, responsible for standing up a coalition-joint engineer staff. Previous assignments include command of the "Fightin' 5th" Engineer Battalion, service with Joint Task Force Bravo in Honduras, and teaching at West Point and the Army War College. A graduate of the U.S. Military Academy, the Army and Naval War Colleges, and the Massachusetts Institute of Technology, he holds a Ph.D. in construction engineering management and public policy.

Photos by Jayme Loppnow, 130th Engineer Brigade Public Affairs.

The author would like to thank the following people:

- Those great Americans and allies who shed their blood or gave their lives to free Iraq.
- The soldiers and civilians of the 130th Engineer Brigade, V Corps, and CJTF-7 who put their lives on the line to liberate Iraq and win the peace; and the superb leaders of the 130th Engineer Brigade, V Corps staff engineer section, CJTF-7 C-7, and MSC engineer units who planned, co-ordinated, and fought the engineer fight.
- Every member of the worldwide engineer team—military, civilian, and contractor—who had a role in fielding, training, deploying, supporting, and fighting with the Engineer Regiment in Operation Iraqi Freedom.
- Members of the 130th Engineer Brigade who provided ideas, input, and comments for this article.

(Note: For more information on the 130th Engineer Brigade, after-action reviews, SOPs, articles, and photos, see the 130th Engineer Brigade Web sites at NIPRNET <<http://www.130thengineers.army.mil>> or SIPRNET <148.35.87.68>.)

130th Engineer Brigade Lessons Learned and Recommendations From Operation Iraqi Freedom

By Colonel Gregg F. Martin

Using the Training and Doctrine Command's (TRADOC's) doctrine, organization, training, materiel, leader development, personnel, and facilities (DOTMLPF) format, this information is divided into strengths that should be sustained and areas of concern that should be improved.

Doctrine

Sustain

- We needed and received many EAD engineers, but we needed them earlier in the force flow.
- The military decision-making process works. Teach and use these concepts, along with ways to modify them on the fly in combat.
- The assured mobility concept is sound. Continue to develop and teach it.
- Aggressive, rapid execution works. Teach "A partial solution now!" and ways to tailor and employ flexible mission modules in combat.
- Active and Reserve Component integration worked. Teach leaders how to build a cohesive team in combat. Build on this success.
- Units simultaneously commanded and controlled deployment, RSOI, high- and low-intensity conflict, stability operations, and support operations. Understand how this was done, and continue to develop this flexibility in our leaders.
- The adaptability and flexibility of engineers in rapidly executing numerous nondoctrine missions was excellent. Build on this success.
- The ability to task-organize to tailor the right mix of skills and forces for the mission was a success.
- The integration of hard-skilled USACE engineers into the fight worked well.

Improve

- We must do a better job of "telling the engineer story" to the Iraqi, American, and world media. Public affairs and information operations are fundamental and must be an integral part of the plan and campaign—not a nice-to-do add-on. The entire force needs extensive education, training, and organizational adjustment to improve in this strategically crucial pillar of modern warfare.
- We must understand the proper use of command and support relationships. Leaders must resist the urge to assign "units to missions" and must instead assign "missions to units," especially in stability operations and support operations.
- Engineers are flexible and possess a "can-do" spirit. However, leaders must resist the urge to use them for everything because we quickly run out of engineers and do not have them available to perform critical engineer missions, especially during stability operations and support operations.

- We need to better understand and teach "how-to-fight" combat heavy battalions, CSE companies, multirole bridge companies, FEDs, FETs, FEST-As, etc.
- The transition from the ground offensive to stability operations and support operations was very challenging. We need to understand, teach, and plan this better.
- Construction contractors did not deliver as much or as quickly as planned and expected. Troops must be ready to go it alone with little contract construction support for a long time in an austere and dangerous environment. We need to use host-nation engineer capabilities as much as possible.

Organizations

Sustain

- Combat heavy battalions, CSE companies, and corps wheeled battalions provide powerful, multifunctional capabilities. We need more of these units in the Active Component.
- All engineer headquarters—brigade, group, and battalion—are huge force multipliers. We need to embed or plug in key enablers such as a CMS, civil affairs, linguists, and contracting, especially for stability operations and support operations.
- The O-6 division engineer brigade headquarters has been a huge force multiplier in all phases of the campaign. We must retain these in the heavy divisions.
- Always attach separate companies and detachments to a battalion, which provides "family, love, and discipline." When this did not happen, we had problems.
- The FEST-As were a huge success in terms of reachback and technical expertise. We need to resource and fund one per corps, division, and armored cavalry regiment. We should embed this in organization and doctrine.
- Employment of the 1138th Engineer Battalion headquarters (Missouri Army National Guard) as the V Corps/CJTF-7 Mine Explosive Ordnance Information Command Center was a success. It resulted in a superb "fusion center" for information and analysis of enemy mines and explosive threats.

Improve

- A TAEB or engineer command would have been ideal for the enormous engineer mission in Iraq, especially after the ground offensive. At a minimum, the equivalent CMS and contracting capability should have been provided to the corps combat brigade.
- The optimal task organization evolves over time but is very hard to change, especially if it means taking units away from an MSC. We need to plan and agree in advance on solid disengagement and change criteria for task-organization transitions.
- Leaders need a better understanding and appreciation of low-density engineer units such as prime power platoons, multirole bridge companies and utility detachments, as well

as well drillers, divers, firefighters, FETs, FEDs, and FESTs. Their capabilities must be introduced in professional military education, and the leaders of these units must go to warfighter and other training exercises in order to educate the force through seminars and discussion.

- We need to develop multifunctional EAD engineer battalions that combine combat, construction, and bridging capabilities.
- Quarrying, rock-crushing, and paving capabilities are needed in Active Component combat heavy battalions.
- The Army should officially recognize and staff the 565th Engineer Battalion (Provisional) headquarters and make it our expert bridging unit. The 565th played a crucial role in Operation Iraqi Freedom, because it planned and constructed assault float bridges, medium girder bridges, and Mabey-Johnson bridges throughout Iraq. Other than the 565th, there are no centers of expertise on the proper employment of tactical bridges. The 565th could fill this role.
- We must better educate leaders to resist the urge to break up and farm out the elements of combat heavy battalions to such a degree that we diminish the huge impact they can make on the battlefield. The potential effects of massing EAD engineers—especially in stability operations and support operations—is greatly diminished when they are piecemealed out.
- Every O-6 engineer headquarters needs a construction management capability on its staff. Habitual training associations with FEDs, FETs, or FESTs could fulfill this role.

Training

Sustain

- Our training philosophy was validated in Operation Iraqi Freedom. Focus on the basics. Train better on less.
- Topographic engineering was a huge success. Build on what we have, and continue to improve our topographic training, organization, materiel, and doctrine. This is a huge force multiplier.
- The development of flexible, adaptive, innovative leaders and soldiers was a success. All engineers must be trained on basic infantry and engineer skills. All engineer leaders must understand maneuver and combined arms operations, as well as the fundamentals of combat engineering and construction management.
- We continued to train on the threat and enemy situation as they evolved, with weapons ranges, live fires, mounted live fires on the move, situational training exercises that reflect the reality of the threats in Iraq, combat first aid, tactical convoy procedures, reaction to enemy contact and ambushes, and communications procedures. This was critical to soldier readiness and morale, mission accomplishment, and protecting our troops.
- Mobile training teams from the U.S. Army Engineer School were highly beneficial.

Improve

- Engineer Qualification Tables, training programs of instruction, and mission-essential task lists must include

stability operations and support operations in a hostile environment. Examples are convoy operations, ambushes, IEDs, and mounted gunnery.

- Education and training of leaders for postconflict stability operations and support operations should include topics such as contracting, language and cultural knowledge, employment of local workers, and use of local materials and building techniques.
- All Army units need a simple, self-help construction program for nonengineers so their units can quickly enhance their own quality of life with tent floors, basic wiring, burn-out latrines, and field showers. A booklet with simple drawings, instructions, and bills of materials should be developed and issued Armywide. This will allow engineers to focus time and effort on more complex engineer missions.

Materiel

Sustain

- TeleEngineering Toolkits were extremely valuable. We need to distribute them down to the battalion level.
- D9 dozers provided a powerful capability throughout the campaign, and the M1 Panther was also useful. Program and field this equipment with dedicated heavy equipment transports, communications, and weapons.
- The hydraulic excavator (HYEX) or trackhoe and Bobcat® skid steer were big winners.
- The South African IVMMDS was valuable for both counter-IED and countermine operations.
- Continue to use blanket purchase agreements, prime vendors, International Merchant Purchasing Authorization Cards (IMPACs), and local construction materials.

Improve

- Develop and procure a technology to detect and neutralize explosive hazards at a safe standoff distance. Given the threat of IEDs, mines, and ambushes, this is the single most important thing that needs to be improved with the greatest sense of urgency.
- Logistics should be simpler and more responsive. Pre-positioned stocks of engineer supplies would make engineers far more responsive and effective.
- Rebuild or replace old engineer equipment such as the M113 armored personnel carriers, armored vehicle-launched bridges, bucket loaders, water distributors, and small emplacement excavators. Of note, water distributors are absolutely essential for construction in the desert.
- Standardize force protection gear for all soldiers and equipment, such as weapons mounts, improved body armor, Kevlar® blankets, improved armor for high-mobility, multipurpose wheeled vehicles (HMMWVs), and more crew-served weapons.
- Develop and fund a secure cellular telephone system for use on the battlefield. All units should deploy with satellite nonsecure Internet protocol router (NIPR) systems for reliable official communications and morale, welfare, and recreation support.

- All military equipment needs to be dual voltage.
- National Guard units must deploy with IMPACs and pre-purchased spare parts (prescribed load list [PLL] and authorized stockage list [ASL]).

Leader Development

Sustain

- Strong, positive, caring leadership works. We validated our philosophy of leadership in training, deployment, preparation for combat, combat operations, stability operations, and support operations.
- A clear mission, task and purpose, and commander's intent are critical; then power down and let folks amaze you. Keep teaching and rewarding this.
- Commanders must be forward and present on the battlefield. Figure out the critical missions and locations, and then go there.
- There is no substitute for "eyes-on" and face-to-face communications, especially in combat.
- Many leaders developed and nurtured strong and productive relationships with Iraqi civil leaders. This must be encouraged, taught, and expanded in the future.
- The Army grows and selects great battalion commanders.
- Leaders must take care of themselves with rest, food, water, hygiene, and time to recharge their batteries. Otherwise, they burn out.
- One-year tours are like an ultramarathon. Leaders must establish a pace to finish the race strong. Balancing mental, physical, spiritual, and social needs is key to thriving in a grueling and dangerous environment. Mission comes first, but strive to make time for training, maintenance, and officer and noncommissioned officer professional development, as well as physical training, chapel, sports, and events such as movie nights, karaoke nights, and soldier talent shows. Leaders must make time for fun! They must grow better leaders and build a stronger team every day. Balance is key to sustaining the force today in Iraq, as well as over the long term for the future.

Improve

- All engineers must be builders. Basic and career course curriculums must ensure that engineer leaders are prepared to build.
- Engineer officers need more knowledge in contracting and facilities management, as well as civil affairs, culture, and language, especially during stability operations and support operations.
- Work to develop even smarter, more flexible, adaptive, and determined leaders who are comfortable in a volatile, uncertain, complex, ambiguous, and dangerous environment. Never assume that engineers will perform only "engineer missions."
- Leaders (especially at engineer group/brigade level and above) need a better understanding of low-density EAD units, such as FEST-As, FEDs, FETs, utility detachments, prime power platoons, firefighters, divers, and well drillers.

- While deployed, fill empty Reserve Component platoon leader slots with excess Active Component lieutenants.
- Leaders need to better prepare themselves and their troops for extended deployments of one year or more. This is a leadership challenge.

Personnel

Sustain

- Our people are everything. Most of our leaders understand and live this.
- Engineer enthusiasm and can-do spirit, along with initiative, flexibility, adaptability, dedication, professional expertise, and team spirit were hallmarks of the campaign.
- Engineers displayed raw courage and bravery every day, all over Iraq.

Improve

- Manage and pay better attention to low-density units from the start.
- Keep unit integrity during deployments.
- Fix the Reserve Component replacement system; they received no replacements during Operation Iraqi Freedom.
- Many units were not filled to authorized strength before deployment. Strive to meet authorized manning levels.
- Management and rotation of captains is out of sync with the needs of the field. New career course captains serve on brigade and corps staffs before getting company command. Once branch-qualified, they immediately depart the theater and cannot be used on brigade- or corps-level staffs, where their expertise is sorely needed.

Facilities

Sustain

- We did a good job of using captured Iraqi facilities, as well as tapping into and developing Iraqi construction capability.

Improve

- Before the fight, we must develop a comprehensive strategic plan for postconflict engineering, base camps, and force beddown. Simultaneously, we must streamline and expedite approval and funding of contingency military construction projects.
- Engineers are expected to be the experts on all aspects of infrastructure, to include civil, military, and captured enemy facilities. They need more training in these areas, as well as in facilities and contract management.
- We need clear legal rules early on regarding the purchase and/or construction of beddown facilities such as containers and trailers.
- We must develop, procure, and deliver Force Provider packages for deploying units.
- FEST, FED, FET, and prime power representatives must be present during the early phases of planning and on the ground early, located forward with the units they will support.